

DOCUMENT RESUME

ED 199 493

CE 028 303

TITLE Bilingual Vocational Training Program. Auto Body Repair. Module 1.0: Beginning Auto Body.

INSTITUTION Northern New Mexico Community Coll., El Rito.

PUB DATE [80]

NOTE 73p.; For related documents see CE 028 291.

EDRS PRICE MF01/PC03 Plus Postage.

DESCRIPTORS Adult Vocational Education; *Auto Body Repairers; Behavioral Objectives; *Bilingual Education; *Construction (Process); Individualized Instruction; Learning Activities; Learning Modules; *Motor Vehicles; Occupational Information; Postsecondary Education; Pretests Posttests; Repair; Second Language Learning; *Spanish; Trade and Industrial Education; *Vocabulary Development

ABSTRACT

This module on beginning auto body is the first of four (CE 028 303-306) in the auto body repair course of a bilingual vocational training program. The course is designed to furnish theoretical and laboratory experience in welding, metal straightening, metal finishing, painting, and use of power and hand tools. Module objectives are for students to develop trade-related Spanish/English vocabulary; to identify auto body repair job classifications; and to identify different metal strengthening methods used in constructing vehicles, different vehicle frame constructions and their purpose, types of body construction and their purpose, and different units of hardware and trim and their purpose. Contents include list of module objectives; pretest; five sections on (1) auto body technicians, (2) metal strengthening, (3) frames, (4) body construction, and (5) hardware and trim; posttest; and English/Spanish vocabulary list. Each section is organized into this format: instructions, vocabulary, and concepts (statements or questions to direct reading) presented in English and Spanish; readings in English and Spanish; and worksheets to evaluate comprehension of the trade-related reading material. Worksheets also cover these areas: vocabulary, definitions, word attack skills, writing skills, spelling, and application of terminology to the trade area. Supplemental worksheets and exercises are appended. (YLB)

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BILINGUAL VOCATIONAL TRAINING PROGRAM

AUTO BODY REPAIR

MODULE 1.0

BEGINNING AUTO BODY

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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EL RITO, NEW MEXICO 87530

MODULE CONTENTS

- 1.1 Auto Body Technicians
- 1.2 Metal Strengthening
- 1.3 Frames
- 1.4 Body Construction
- 1.5 Hardware and Trim

AUTO BODY REPAIR

Auto Body Repair is designed to furnish theoretical and laboratory experience in welding, metal straightening, metal finishing, painting and the use of power and hand tools. Shop procedures and equipment, common to that of the industry, are emphasized. Conditions and assignments are similar to those of a full time Auto Body repair shop.

MODULE OBJECTIVES

1. To develop trade related Spanish/English vocabulary
2. To identify auto body repair job classifications
3. To identify different metal strengthening methods utilized in constructing vehicles
4. To identify different vehicle frame construction and their purpose
5. To identify types of body construction and their purpose
6. To identify different units of hardware and trim and their purpose

ACTIVITIES

To clarify the purpose of each reading, the instruction, vocabulary and concepts are presented in Spanish and English.

Readings are followed immediately by a series of diversified worksheets which evaluate comprehension of trade related material.

Oral language development exercises, directed by the instructor, are presented to reinforce written concepts. Students are encouraged to utilize and expand their technical vocabulary by engaging in discussion with other students, the instructor and the tutor.

Audio visual materials are utilized to introduce subject matter. These materials are readily available to students and may be used on an individual or group basis.

Students are instructed to utilize supplementary material available in the Learning and Resource Center, and as a result re-enforce concepts presented in the module.

EVALUATION

Module Pre-Test (Any student who scores 90% or below will complete entire module)

Module Post-Test (Any student who scores 90% or below will repeat areas where improvement is necessary)

Worksheets

Oral Exercises

Supplementary materials

Pre-Test

1. Name the job classifications in an auto-body repair business.
2. In your own words explain what an auto body apprentice is.
3. Name the different methods used to strengthen metal.
4. Explain the two types of crown surfaces.
5. What is a vehicle frame?
6. Describe a vehicle frame's drop center.
7. Name the two types of body construction.
8. Name the major panels of the two types of body construction.
9. What purposes do hardware and trim serve?
10. Name six examples of hardware and trim.

Instructions:

The following reading contains information on jobs and training for auto body technicians. Questions are included at the end of the section. Read all the information carefully then answer all the questions.

Instrucciones:

La siguiente lectura contiene información tocante al empleo e instrucción práctica para reparadores de carrocería. Hay preguntas al término de la lectura. Léase toda la información cuidadosamente luego conteste las preguntas.

Vocabulary

skill
craftsman
apprentice
journeyman
panel
operator
steering mechanism
alignment
upholsterer
painter
estimator
adjuster
windshield
vinyl
convertible
weld

Vocabulario

habilidad
artesano
aprendiz
jornalero
hoja
operario
mecanismo de dirección
alineamiento
tapicero
pintor
estimador
mediador
parabrisas
vinilo
convertible
soldadura

Remember the following questions as you read the information.
Recuerde las siguientes preguntas al leer la información.

1. How can someone get training as an auto body repairman?
¿Cómo puede una persona entrenarse como reparador de carrocería?
2. What are the job classifications in an auto body repair business?
¿Cuáles son las clasificaciones de trabajos en un establecimiento?
3. Which are the auto body repair businesses that employ more technicians?
¿Cuáles son los negocios de reparos de carrocería que ocupan más reparadores?

Auto Body Technicians

1. The auto body technician is a skilled craftsman who has learned the trade through an apprenticeship or by training in a vocational program.
2. The technician who learns the trade by means of on the job training (O.J.T.) is referred to as an apprentice. He begins by observing the work and gradually progresses by doing various types of tasks. After three to four years of training the apprentice becomes eligible for a journeyman position.
3. Unlike the apprentice, the student who attends a vocational school acquires a knowledge of the basic body construction of an automobile. He also learns to operate power equipment and develops skills in straightening damaged panels. The student spends about a year and a half in school and after graduating is eligible for employment as a journeyman. Most employers prefer to hire vocational graduates over apprentices.
4. Job classifications in the auto body repair business are:
 - Auto Body Repairman (Journeyman) - Must be capable of removing dents, replacing damaged parts, welding and cutting panels, applying and sanding filler.
 - Power Equipment Operator - Must be knowledgeable of auto body construction and proper use of power tools.
 - Steering Alignment Specialist - Must be able to replace and align steering mechanisms and know proper use of an alignment machine.
 - Glass Installer - Installs windshields and door glass.
 - Upholsterer - Repairs or replaces headlining, seat covers, door panels, convertible and vinyl tops, padding and springs.
 - Auto Body Painter - Must have working knowledge of proper painting equipment. Must clean surface, mask, check paint and surface temperature, thoroughly mix paint and accurately match colors.

1. El técnico en carrocería es un artesano que ha aprendido su trabajo durante un aprendizaje o ha recibido instrucción en un programa vocacional.
2. El técnico que aprende su oficio por medio de instrucción práctica se le llama aprendiz. Observa primero el trabajo y luego poco a poco se desarrolla desempeñando diferentes tipos de tareas. Después de haber servido un aprendizaje por tres o cuatro años el aprendiz ya califica para un puesto de jornalero.
3. El estudiante que asiste a una escuela vocational aprende la construcción básica de un automóvil, el aprendiz no recibe este tipo de instrucción. El estudiante también aprende como manejar equipo de motor y desarrolla habilidades para poder enderezar vehículos. Después de haber asistido a la escuela por un año y medio el estudiante se gradúa y califica para empezar a trabajar como jornalero. Muchos que ocupan esta clase de técnicos prefieren emplear graduantes mejor que aprendices.
4. He aquí las clasificaciones de empleo en un negocio de carrocería:
Reparador de Carrocería (Jornalero) - Tiene que ser capaz de quitar abolladuras, reponer partes dañadas, cortar y soldar hojalata y poner y lijar masilla.
Manejador de Equipo de Motor - Tiene que tener el conocimiento de la construcción de la carrocería de un vehículo y saber el uso propio del equipo de motor.

Answer the following:

1. In detail describe two ways for someone to learn the auto body repair business.

2. Describe the following job classifications in the auto body repair business.
Repairman -

Power equipment operator -

Alignment specialist -

Painter -

Estimator -

3. In your own words, write as much as you can about a job or jobs you would like to perform in a shop and why.

Instructions:

The following reading contains information on methods used to strengthen metal. Questions are included at the end of the section. Read all the information carefully then answer all the questions.

Instrucciones:

La siguiente lectura contiene información tocante a los métodos que se utilizan para darle solidez al metal. Hay preguntas al término de la lectura. Léase toda la información cuidadosamente y luego conteste las preguntas.

Vocabulary

metal
strength
thick
gauge
crown
surface
fender
curved
hood
angle
flange
U-channel

Vocabulario

metal
solidez
grueso
gruesor
corona
superficie
guardafango
encorvado
capó
ángulo
reborde
canal U

Remember the following questions as you read the information.

Recuerde las siguientes preguntas al leer la información.

1. Which are the different methods of metal strengthening?
¿Cuáles son los diferentes métodos que se usan para darle solidez al metal?
2. What is the most common use of each method?
¿Cuál es el uso más común de cada método?

Metal Strengthening

1. An auto body technician must know how metal is formed and strengthened in order to make the proper repairs.
2. The strength of the metal, in older model cars, was acquired from its thickness. After many years of research new methods of metal strengthening were developed. As a result, factories introduced the light gauge metal which is currently being utilized. These new methods also involved shaping the panels into different forms, especially crowns.
3. Metal formations that are most characteristic of fenders and bodies are probably curved surfaces. These curved metal surfaces are usually called crowns. A good illustration of a crown surface is encountered on page 13.
4. A piece of sheet metal which has a flat surface is not as strong as the same sheet would be if it were a crown. A crown surface also has more of a tendency to return to its original form, provided it hasn't been bent too far.
5. Other curved surfaces that are used in the car industry are the low crown and the high crown surfaces. A low crown surface is one that has a small crown or is not curved very much. This type of surface is commonly found in the almost flat portions of an all-steel top or hood. A surface that has an extreme crown or is rounded in all directions is a high crown.

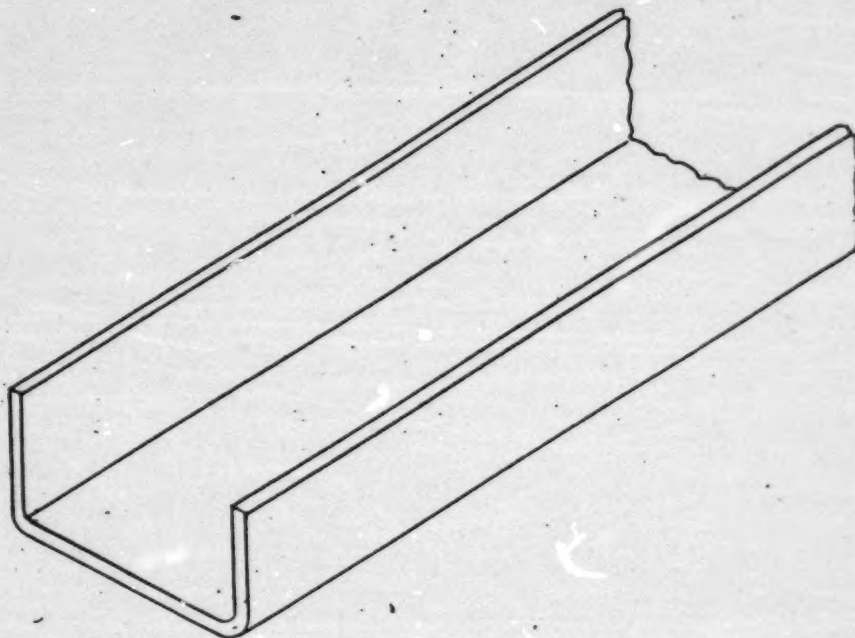
Solidez del Metal

1. Para poder hacer los reparos propios debe de saber , el técnico en carrocería, como se forma y que le da fuerza al metal.
2. En coches más viejos el gruesor era lo que le daba su fuerza al metal. Después de muchos años de investigaciones se desarrollaron métodos nuevos de darle fuerza. A causa de estas investigaciones las fábricas introdujeron un metal más delgado que ahora mismo se utiliza. Incluidos en estos métodos fue encorvar o formar la oja de metal como una corona.
3. Generalmente las superficies encorvadas son las que se usan en los guardafangos. Estas curvaturas ordinariamente se llaman coronas. Un dibujo de una corona se halla en página 13.
4. Una oja de metal encorvada tiene más solidez que el mismo pedazo tuviera si fuera plano. Es más fácil enderezar una forma encorvada si no se ha appuchurrado mucho.
5. La corona elevada y la poco elevada son otras superficies que se usan en la construcción de carros. Las coronas poco elevadas se hallan en partes del coche así como en el capó. Una superficie bastante encorvada, que se redondea hacia todos lados, se le llama corona elevada.
6. Además de encorvar el metal hay otros métodos que se utilizan para darle fuerza. Pueden formarse las hojas de metal en ángulos o rebordes. Estos generalmente se usan para darle firmeza a las orillas que la necesitan. Este modo de formar el metal no se puede usar cuando la superficie es lisa, entonces se usa extensivamente en la construcción interior de vehículos.
7. Metal en forma de u y de caja también se utiliza para darle fuerza al metal. El de forma u, se forma como la letra u. (Fig. 1 página 12).

6. There is yet another method, other than crowns, that is very useful in metal strengthening. Metal is formed into highly stressed angles or flanges along the edges of large sheets or panels. These are more commonly used to stiffen any unsupported edges. This type of metal formation cannot be used when a smooth surface is needed, consequently, it is widely used in the interior construction of automobile bodies.
7. U-channels and box sections are also employed to strengthen metal. The U-channel, as the name indicates, is shaped like the letter U (Fig.1 Page 12). This is a flat piece of metal with two edges turned at right angles in the same direction. U-channels are mostly used on inner body construction but the most common use is in automobile frames.
8. Another form of metal construction is two U-channels welded together to create a box section (Fig.2 Page 12). This is the strongest of all methods discussed so far. It is for this reason that box sections are used in body frames or where great strength is necessary.
9. It is recommended that the auto body technician inspect body constructions of vehicles brought in for repairs. All vehicles have at least one or more of the methods of metal construction mentioned in this section; crowns, angles, flanges, U-channels, or box sections. Many other odd types of construction may be used, however, they will only be a variation of one of these basic forms.

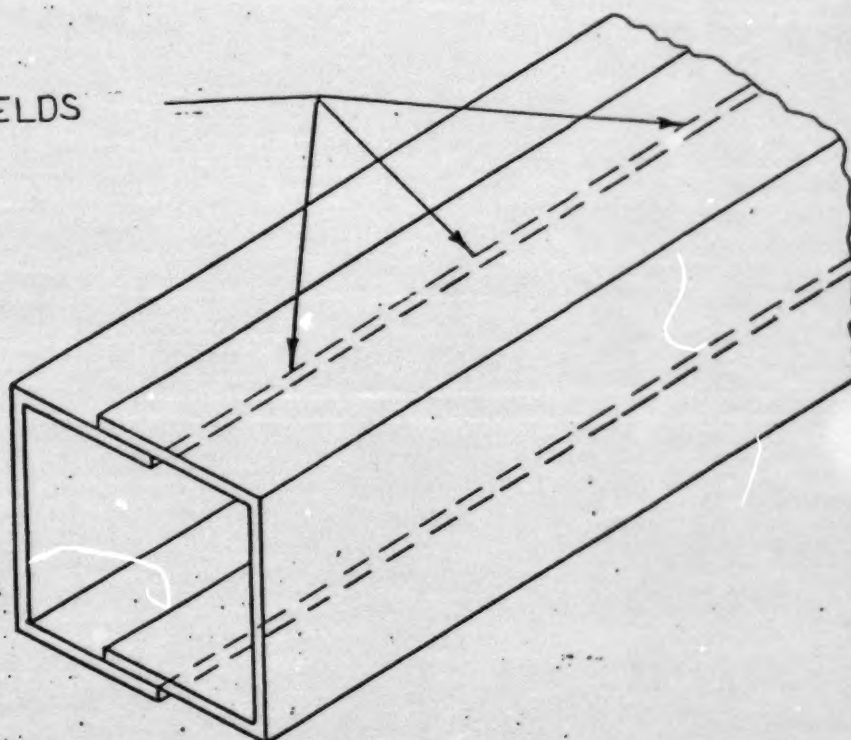
Es un pedazo de metal plano que se ha formado doblando la dos orillas en la misma dirección. Esta forma de metal se usa en el interior del coche pero el uso más común es en el armazón del vehículo.

8. Otro método de darle otra forma al metal es cuando se unen dos pedazos de forma u y se produce el metal en forma de caja. (fig 2, página 12). Además de los métodos que ya se han discutido este es el más fuerte. Por esta razón el metal en forma de caja se usa en armazones o donde se requiere suficiente solidez.
9. Se les aconseja a los técnicos en carrocería que deben de examinar la construcción del coche antes de empezar a repararlo. Siquiera una de las formas de metal, que se han discutido, se han usado en la construcción de un vehículo. Se pueden usar otras formas raras pero todas se parecen a la forma básica.



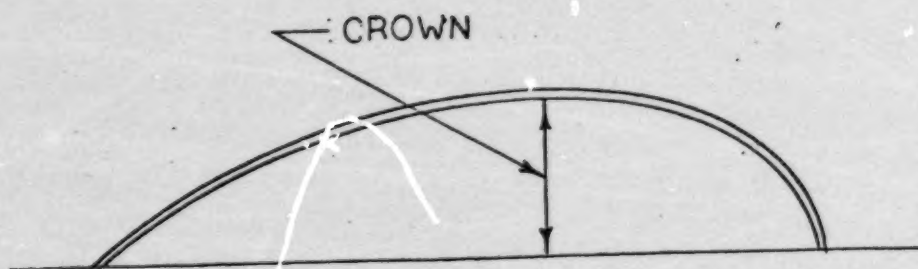
PRESSED U-CHANNEL FORM Fig. 1

AREA OF WELDS

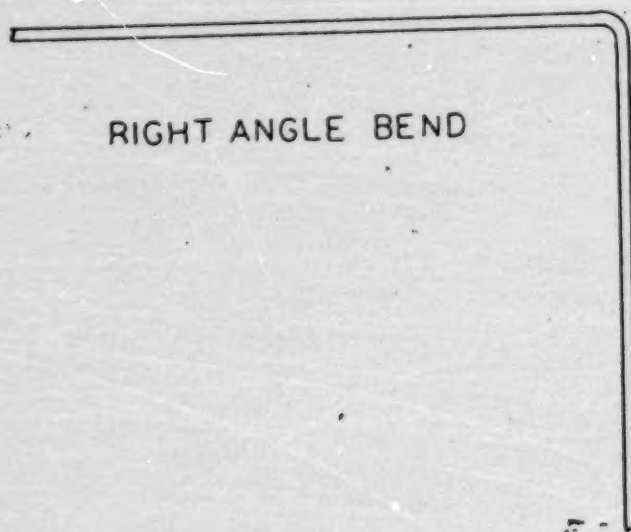


BOX FORMED WITH TWO U's Fig. 2

1.2



RIGHT ANGLE BEND



Parts Manager - This position is primarily found in large shops; must keep a sizeable inventory of collision parts.

Estimator - Is considered one of the most important positions in a body shop; should be able to estimate cost of repair as accurately as possible.

Owner/Manager - Supervises and assigns work loads, balances company books, purchases equipment, establishes pay scales and often does some repair work. Is in charge of overall shop operations.

Insurance Adjuster - Has a vast knowledge on costs of repairs and paint work, and recommends to insurance companies a reasonable amount of expenditure for repairs of damages. This is one of the highest paying positions in the auto body repair business.

5. Skilled auto body technicians are sought by independent shops, automobile and truck dealerships, trucking companies and bus lines.
6. Wages earned by auto body technicians vary throughout the country but are comparable with salaries earned by automotive mechanics. In some shops the technician is paid a fixed salary plus commission. This system yields a salary based on accomplishments.
7. The demand for qualified technicians increases every year. It is estimated that there are over 130,000,000 vehicles on the roads of the United States. It is also estimated that each year over 5,000,000 new vehicles are manufactured. The future for skilled body technicians looks promising.

Especialista en Alinear el Anterior del Vehículo - Tiene que saber reponer y alinear el mecanismo que guía y saber el uso propio del equipo de alinear.

Cristalero - Pone parabrisas y otros cristales.

Tapicero - Compone y repone tapicería.

Pintor - Debe de saber el uso propio del equipo de pintar. Limpia la superficie, cubre, examina la pintura y la temperatura de la superficie, mezcla enteramente la pintura para que sea igual con la original.

Director de las Partes - Este puesto es más común en talleres grandes. Su obligación es de mantener suficientes partes que se utilizan en el taller.

Estimador - Se considera el puesto más importante en un taller, tiene que poder calcular, lo más exacto posible, los costos de reparo.

Dueño/Director - Revisa y asigna el trabajo, asienta cuentas, compra equipo, establece sueldos y algunas veces hace trabajo práctico del taller. Está encargado de todo.

Mediador de Seguros - Tiene bastante experiencia en los costos de componer y pintar. Recomienda a las compañías de seguros una suma de gastos razonables para reparar el daño. Es uno de los puestos donde se gana más sueldo en esta clase de empleo.

5. Se solicitan técnicos con bastante habilidad por talleres independientes, negociantes de carros y camiones y compañías de autobuses y camiones.
6. Los sueldos que ganan estos técnicos varían por todo el país, pero se comparan con los sueldos que ganan los mecánicos. En algunos talleres el técnico gana un sueldo fijo, más su comisión. Así el sueldo que se gana se basa según la suma de trabajo que se desempeña.

7. Técnicos calificados se necesitan cada año más y más. Se estima que hay 130,000,000 de vehículos en las carreteras de los Estados Unidos. También se estima que cada año más de 5,000,000 de vehículos nuevos se construyen. El futuro para técnicos de bastante habilidad promete oportunidad.

Circle the correct answer

1. A skilled craftsman in the auto body repair business is one who learned the trade through
 - A. O.J.T. or journeyman training.
 - B. O.J.T. or a vocational program.
 - C. an apprentice or O.J.T.
2. An apprentice learns the trade by
 - A. on the job training.
 - B. vocational school training.
 - C. becoming an owner of a shop.
3. The vocational auto body student spends about
 - A. three years in training.
 - B. two and one half years in school.
 - C. a year and a half in school.
4. After three or four years of training the apprentice is eligible for
 - A. a journeyman position.
 - B. an adjuster position.
 - C. a manager position.
5. Other positions in auto body repair, besides the apprentice and the journeyman are
 - A. the power equipment operator, steering alignment specialist, glass installer, upholsterer, painter, and the owner/manager.
 - B. the insurance adjuster, parts manager and estimator.
 - C. both A and B.
6. The power equipment operator must
 - A. know auto body construction and proper usage of power tools.
 - B. know how to give estimates.
 - C. know how to use the alignment machine.
7. The glass installer
 - A. aligns cars.
 - B. uses power equipment.
 - C. installs door glass and windshields.

8. Person who recommends to insurance company the amount that should be paid for repairs is the
 - A. estimator.
 - B. adjuster.
 - C. insurance salesman.
9. Most auto body technicians find work in
 - A. independent shops and auto and truck dealerships.
 - B. trucking companies and bus lines.
 - C. both A and B.
10. A graduate from a vocational program is eligible for
 - A. a journeyman position.
 - B. an apprenticeship.
 - C. an insurance adjuster position.

Match the following:

- | | |
|--------------------------------|--|
| _____ Alignment specialist | A. knows auto body construction and usage of power equipment. |
| _____ Glass installer | B. replaces and aligns steering mechanisms. |
| _____ Painter | C. removes dents, cuts, welds, and/or replaces damaged panels. |
| _____ Estimator | D. recommends amount insurance company should pay for repairs. |
| _____ Adjuster | E. installs windshields and/or door glass. |
| _____ Power equipment operator | F. matches and mixes paint. |
| _____ Journeyman | G. estimates cost of repairs. |

True or False

- _____ 1. A journeyman is one who learned the trade through an apprenticeship or vocational program.
- _____ 2. The auto body painter must accurately match colors.
- _____ 3. The insurance adjuster must accurately adjust the steering.
- _____ 4. One of the highest paid positions in auto body repair is the apprentice.
- _____ 5. In some shops the technicians are paid a fixed salary and then are deducted the commission.
- _____ 6. The demand for skilled technicians increases every year.
- _____ 7. Most employers prefer to hire apprentices over vocational school graduates.
- _____ 8. The auto body student spends about a year and a half in vocational school.
- _____ 9. The steering alignment specialist must replace and align the steering mechanisms.

Find The Answers

1. The strength of the metal, in older model cars, was acquired from its
 - A. thin metal.
 - B. crowns.
 - C. box sections.
 - D. thickness.

2. The reading does not say so, but it makes you think that
 - A. crowns are the strongest methods for strengthening metal.
 - B. flanges are left angle bends.
 - C. very little thick metal is used in new cars.

3. U-channels are shaped like a W.

Yes	No	Does not say
-----	----	--------------

4. On the whole, this reading is about
 - A. U-channels.
 - B. metal strengthening.
 - C. right angles.

5. Why is it important to know how metal is formed?
 - A. To make repairs.
 - B. To be able to make cars.
 - C. To make frames.

Fill in the blanks

g__u__e

s__c__ion

c__ow__

c__an__el

a__g__e

__ox

fl__n__es

m__t__l

t__i__kn__ss

__en__

s__rf__ce

s__re__gt__

e__g__s

f__am__

a__qu__in__

s__o__th

r__p__ir

__ody

True or False

- ____ 1. In old cars the formation of the metal was obtained by using thin metal.
- ____ 2. A flange is a right angle bend.
- ____ 3. The U-channel has double right angle bends.
- ____ 4. A U-channel is shaped like a U.
- ____ 5. A box section is made by welding a U-channel with a crown.
- ____ 6. Flanges or angles are used when a smooth surface is required.

Answer the following:

1.2

1. What is a crown surface?
2. What is the difference between a low crown and high crown?
3. What is an angle or flange?
4. What is a U-channel?
5. What is a box section?

Instructions:

The following reading contains information on the types and construction of automobile frames. Questions are included at the end of the section. Read all the information carefully then answer all the questions.

Instrucciones:

La siguiente lectura contiene información tocante a los tipos y construcción de armazones de automóviles. Hay preguntas al término de la lectura. Léase toda la información cuidadosamente y luego conteste las preguntas.

Vocabulary

body
steel
frame
drop center
gravity
unitized
passenger
vehicle
construction
conventional

Vocabulario

carrocería
acero
armazón
centro sumido
gravedad
unificado
pasajero
vehículo
construcción
ordinario

Remember the following questions as you read the information.
Recuerde las siguientes preguntas al leer la información.

1. What is a frame?
¿Qué es un armazón?
2. What is drop center?
¿Qué es centro sumido?
3. What kinds of steel rails are used in frame construction?
¿Qué tipos de barras de acero se usan en la construcción de armazones?

Frames

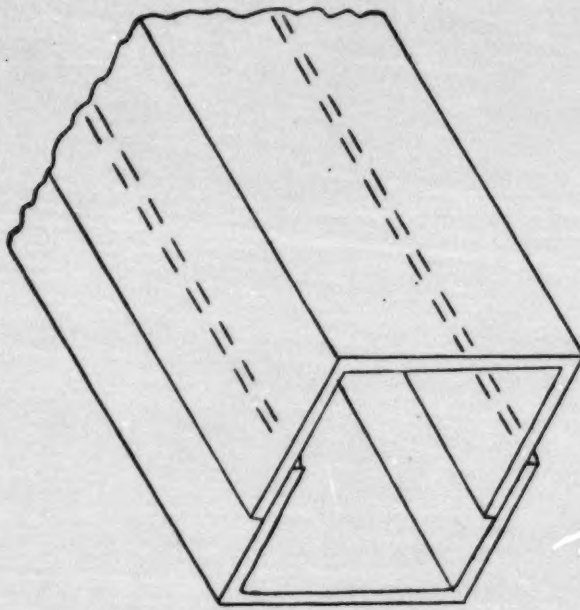
1. Most cars have bodies that are first assembled and then attached to a frame. The frame is an arrangement of two steel rails (U-channels, I-beams, box sections, etc. Page 20) usually braced with crosspieces.
2. Frames are usually constructed wider at the rear than at the front. This allows a shorter turning radius by allowing more room for the front wheels. The wider rear also permits more space for supported load carrying.
3. Several types of vehicle frames are illustrated on page 21; one frame resembles the letter X. The X shaped member is for added strength. Other frames usually employ the heaviest crosspiece under the front section of the engine. Another illustration, on page 22 demonstrates the drop center, a term used in reference to a section of a car frame. The main or center part of the frame drops between the rear and the front. This lowers the vehicle which in turn creates a lower center of gravity for added safety.
4. Some automakers use an assembly method called unitized body construction. In this method the underbody and the frame form one single unit. Unlike the body and frame combination type of construction, the underbody of the unitized body construction cannot be removed from the frame assembly. Some engineers feel that frames built in this manner are much stronger and more durable than conventional type frames.

1. La mayor parte de las carrocerías forman una sola unidad y luego se unen al armazón. El armazón se compone de dos rieles de acero que generalmente se amarran con atravezaños. Estos rieles son de forma U, de forma I, forma de caja, etc, véase página 20.
2. Ordinariamente los armazones se construyen angostos en la parte anterior y anchos en la parte posterior. Esto permite que el vehículo dé una vuelta más corta porque hay más lugar para las ruedas anteriores. También se permite más lugar para llevar más carga.
3. Varios dibujos de armazones se hallan en la página 21. Uno de los armazones se construye semejante a la letra x para que le dé más solidez. Otros armazones ordinariamente llevan un atravezaño pesado abajo del motor. En la página 22 se halla otro dibujo de un armazón con el centro sumido (drop center). Esto denota que el centro del armazón es más bajito que la secciones del anterior y del posterior. El centro sumido reduce la altura del automóvil y así se produce un centro baja de gravedad (gravity) para más seguridad.
4. En algunos vehículos la sección de abajo de la carrocería (underbody) y el armazón forman una unidad. Algunos ingenieros creen que este tipo de construcción es más sólido y más durable que la construcción convencional donde ambos el armazón y la carrocería son distintas partes.
5. El centro sumido se excluye en armazones de camiones y autobuses porque se necesita un suelo plano que permita más lugar para llevar más carga o pasajeros. Por esta razón estos

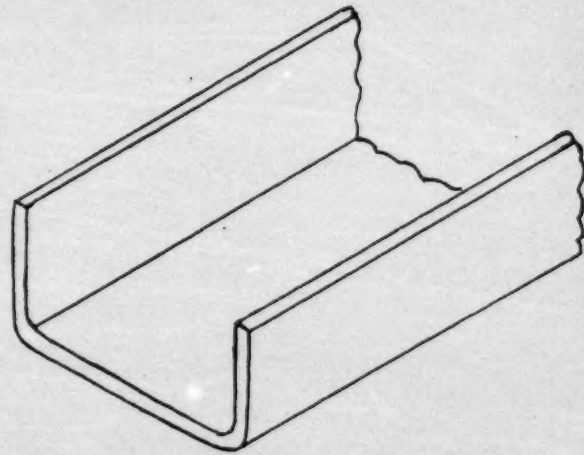
5. Large truck and bus frames exclude the drop center since a low center of gravity is not as important in these vehicles as it is in passenger cars. These frames are usually built flat and as a result create a flat floor for cargo or passenger carrying space. The load strain is greater on these vehicles so consequently the side members are built wider and stronger.
6. It is advisable that auto body technicians study the design and structure of each type of body frame construction by observing them on vehicles brought in for repairs. Different manufacturers may produce frames that vary slightly in size and shape.
7. The frame is often damaged by a collision or impact force. When such damage has occurred the repairman should not attempt to repair the body until the damage on the frame has been corrected.

armazones se construyen más anchos y más sólidos.

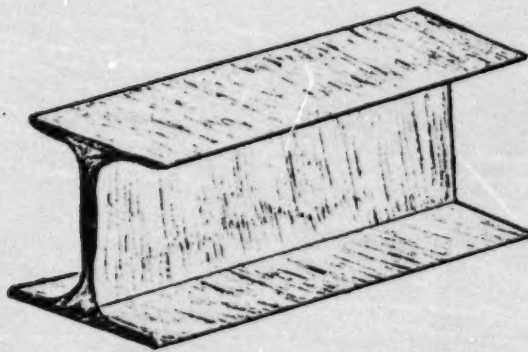
6. Se les aconseja a los técnicos en carrocería que examinen la hechura y tamaño de los armazones en los vehículos que reparan porque no todos se parecen.
7. Muchas veces el armazón también sufre daño en un choque. Cuando esto ocurre se debe reparar el armazón primero.



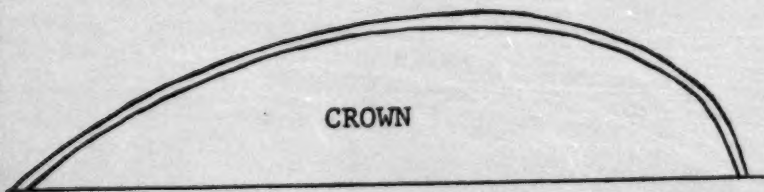
BOX SECTION



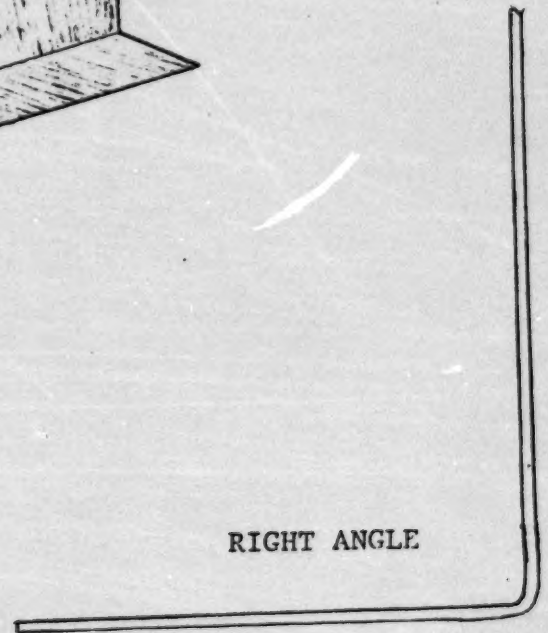
U-CHANNEL



I-BEAM



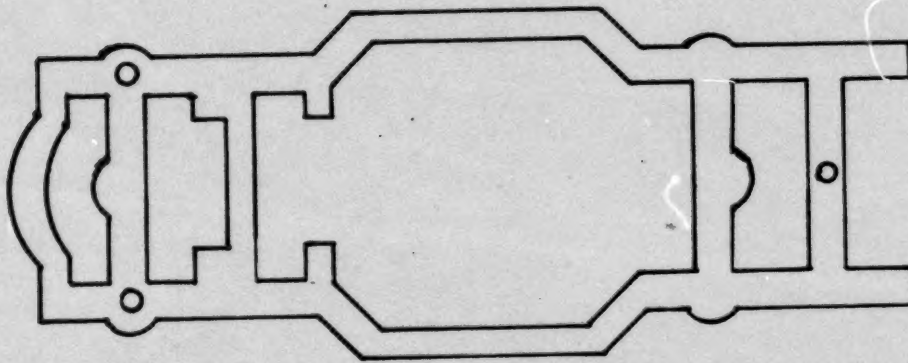
CROWN



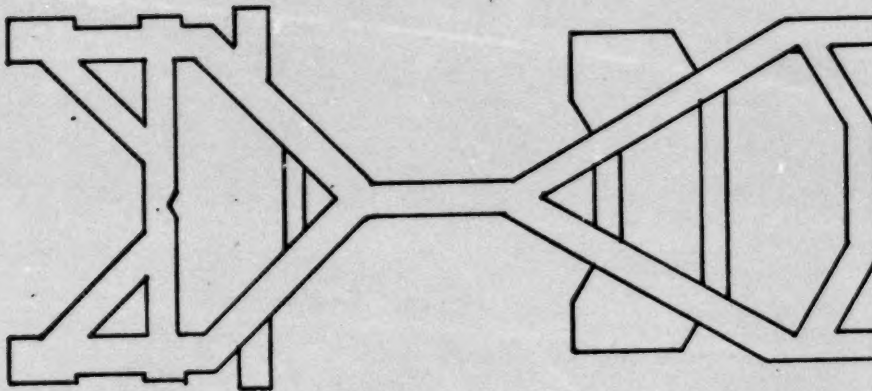
RIGHT ANGLE

TYPICAL CAR FRAMES

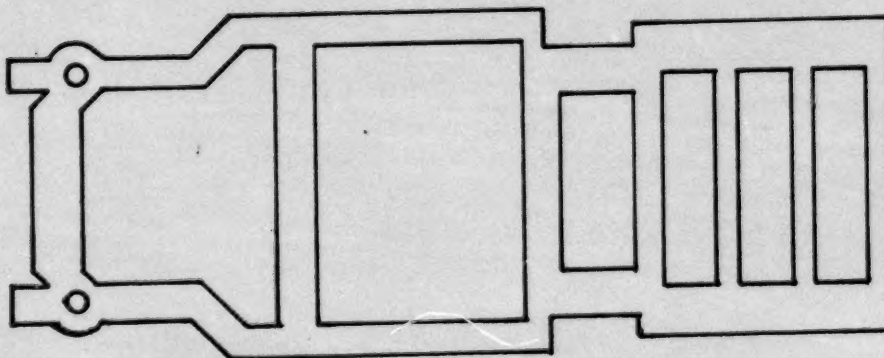
1.3



PERIMETER FRAME

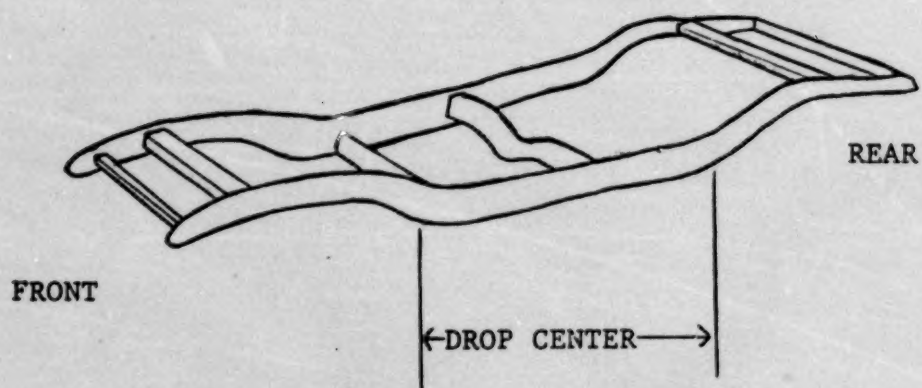


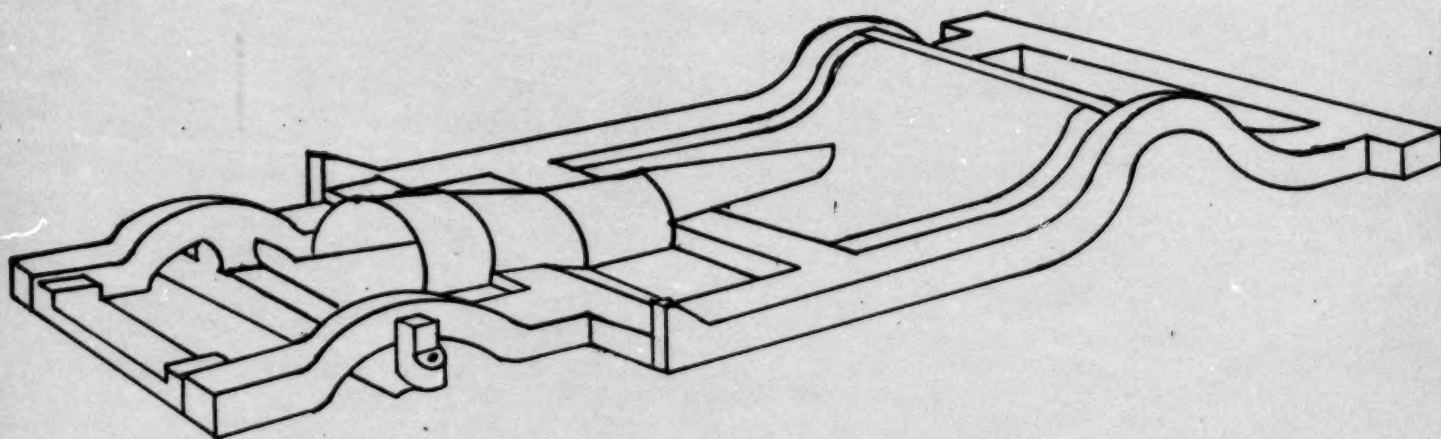
X-TYPE FRAME



LADDER FRAME

PASSENGER CAR FRAME





UNITIZED BODY CONSTRUCTION

Circle the correct answer

1. A frame allows a shorter turning radius and permits more space for loads because
 - A. it has a drop center.
 - B. it is wider in the front.
 - C. it is wider at the rear.
2. The heaviest crosspiece is employed on the
 - A. front section of the engine.
 - B. center section of the engine.
 - C. drop center.
3. The term that refers to the low center section of a car frame is the
 - A. drop center.
 - B. drop lower.
 - C. drop member.
4. When the underbody and the frame form one single unit it is called a
 - A. low center of gravity.
 - B. frame and body.
 - C. unitized body construction.
5. A low center of gravity is not as important in
 - A. large cars and buses.
 - B. large trucks and buses.
 - C. small trucks and cars.
6. In order to carry more cargo or passengers the frames on large trucks and buses are built
 - A. like passenger car frames.
 - B. flat.
 - C. narrow.
7. When there is damage to the body and frame, which should be corrected first?
 - A. The body.
 - B. The frame.
 - C. Both A and B.

8. The auto body technician can best learn the design and structure of each body frame by observing
- A. vehicles on the street.
 - B. vehicles brought in for repairs.
 - C. both A and B.

Fill in the blanks

1. Most frames are constructed wider at the _____.
2. A frame with a wider rear permits more _____ for loads.
3. A wide rear frame allows a shorter turning _____ by allowing more room for the _____ wheels.
4. The _____ body construction cannot be removed from the frame assembly.
5. The center portion of the frame, lower than the front or rear is the _____.
6. The drop center lowers the car which in turn creates a low _____.
7. Some frames employ the heaviest crosspiece under the _____ section of the engine.
8. The drop center is usually excluded on large _____ and _____ frames.

Answer the following:

1. Explain the unitized body construction.
2. What is meant by drop center?
3. What is the purpose of the drop center?
4. Explain the primary difference between a passenger car and large truck or bus frame.

Instructions:

The following reading contains information in reference to the two types of auto body construction. Questions are included at the end of the reading. Read all the information carefully then answer all the questions.

Instrucciones:

La siguiente lectura contiene información tocante a los dos tipos de construcción de carrocería. Hay preguntas al término de la lectura. Léase toda la información cuidadosamente y luego conteste todas las preguntas.

Vocabulary

body or cab
compartment
nucleus
inner
outer
brace
bracket
unitized
conventional
frame
pillar
cowl
dash
underbody

Vocabulario

carrocería
compartimiento
núcleo
interior
exterior
abrazadera
abrazadera
unificado
ordinario
armazón
pilar
pared contrafuegos
tablero de instrumentos
panel del piso

Answer the following questions as you read the information.
Recuerde las siguientes preguntas al leer la información.

1. What are the two types of body construction?
¿Cuáles son los dos tipos de construcción de carrocería?
2. What are the differences between the two types of body construction?
¿Cuáles son las diferencias entre los dos tipos de construcción de carrocerías?
3. What are the major parts in the conventional body construction?
¿Cuáles son las partes principales de una carrocería y un armazón de construcción ordinaria (convencional)?
4. What are the major parts in the unitized body construction?
¿Cuáles son las partes principales de una construcción de carrocería unificada?

Body Construction

1. The cab and body proper are terms referring to a vehicles passenger compartment. The body is completed when the fenders and doors are attached to it. The cab or body proper is the nucleus around which the body is assembled. Body constructions differ, but regardless of the variations they all have a common factor; each has an inner and outer construction.
2. The outer construction may be thought of as the "skin" of a car. Many body experts use the term "skin" when referring to the outer surface of a car.
3. The inner construction is made up of braces, brackets, and panels that strengthen the body.
4. There are two types of body construction; (1) the body and frame (conventional) (2) and the unitized body. The body and frame construction employs a full frame.
5. There are several types of bodies, the most popular being the four-door sedan and the four-door hard top. The difference in these two styles is the center pillar construction. The center pillar is the vertical member found between the front and rear doors. The center pillar on a sedan is attached to the floor pan and the roof side rails which greatly strengthen the body sides. In the hardtop the center pillar attaches only to the floor pan and is as high as the lower door panel which allows an uninterrupted opening from front to rear when the windows are open.

1. La capota o carrocería son términos que se aplican al compartimiento de pasajeros. Cuando se le ponen las puertas y los guardafangos se termina la construcción. Aunque haya diferentes construcciones de carrocerías, todas tienen algo en común, esto es el interior y el exterior.
2. Muchos técnicos en carrocería le llaman "piel" a la construcción exterior de un coche.
3. La construcción interior se compone de abrazaderas y ojas de metal, que le da más solidez a la carrocería.
4. Hay dos métodos de juntar el armazón y la carrocería. El uno es cuando el armazón y la carrocería forman distintas unidades, el otro junta la carrocería y el armazón en una sola unidad.
5. Hay diversos tipos de carrocerías, sin embargo, el sedan de cuatro puertas y el capota dura (hardtop) de cuatro puertas son los más populares. La diferencia en la construcción de ambos es el pilar que se halla entre la puerta anterior y la posterior. Este pilar en el sedan junta el panel del piso y los rieles que soportan el techo, también separa los cristales de la puerta anterior y de la posterior. Esto no ocurre en el capota dura, el pilar no alcanza hasta el techo, solamente a la parte media de la puerta. Cuando se habren los vidrios no se encuentra el pilar por medio.
6. Los siguientes son los paneles de mayor importancia cuando se construye una carrocería convencional. Es importante aprenderse los términos que se le aplican a los paneles porque son los que usan las fábricas en los libros compendiosos (car manuals).

6. The following are the major panels for the body and frame construction. These names should be learned since they are used by the manufacturers in their service and parts manual.

1. Cowl and Dash Assembly - forms the front end of the body. Sometimes called the "firewall" and in some cars includes the windshield frame.

2. Roof Panel or Assembly - is one of the largest panels. Depending on the make and model may extend to the bottom of the front and rear windshields.

3. Underbody - commonly called the floor pan; is shaped to fit around the chassis and frame.

4. Rear Quarter Panel - the section that contains the rear fenders, trunk, etc.

a. Quarter Panel Wheelhouse; inner construction of rear quarter panel.

5. Center Body Pillar - strengthens the side of the body and serves as a lock and hinge support.

7. The unitized body construction employs the same principles that are utilized by the aircraft industry. The main purpose of the unitized body is to strengthen and add rigidity without unnecessary weight. This type of body construction does not use a conventional frame in which the suspension, engine and other components are attached. The following are the major parts of the unitized body.

1. Underbody - differs from the conventional body in the construction of the floor pan. The floor pan is made up of channels, box sections, formed rails, reinforcements and the suspension members.

2. Upperbody - resembles the conventional body construction, the major difference is the package tray area in the rear and the construction that joins the front fenders.

3. Unitized Body Variations - these variations depend on different car models. In some units the entire front end area may be removed from the cowl firewall where it has been bolted.

1. Pared Contrafuegos y Panel de Instrumentos - forma la parte anterior de la carrocería; algunas veces se incluye el bastidor de parabrisas.

2. Panel del Techo - es uno de los paneles más grandes. Según el modelo de coche, el panel se puede extender desde la parabrisa hasta la ventanilla trasera.

3. El Panel del Piso - se forma en modo que acomode el chasis y el armazón.

4. Panel Posterior - la sección que contiene los guardafangos, el baúl, etc.

5. Pilares Centralizados - le dan solidez al lado de la carrocería y sirven para montar las puertas.

7. La construcción donde el armazón y el panel del piso forman una sola unidad también se utiliza en la industria aeronáutica. El propósito de este tipo de construcción es para darle solidez y rigidez sin añadir más peso. Las siguientes son las partes de mayor importancia en este tipo de construcción.

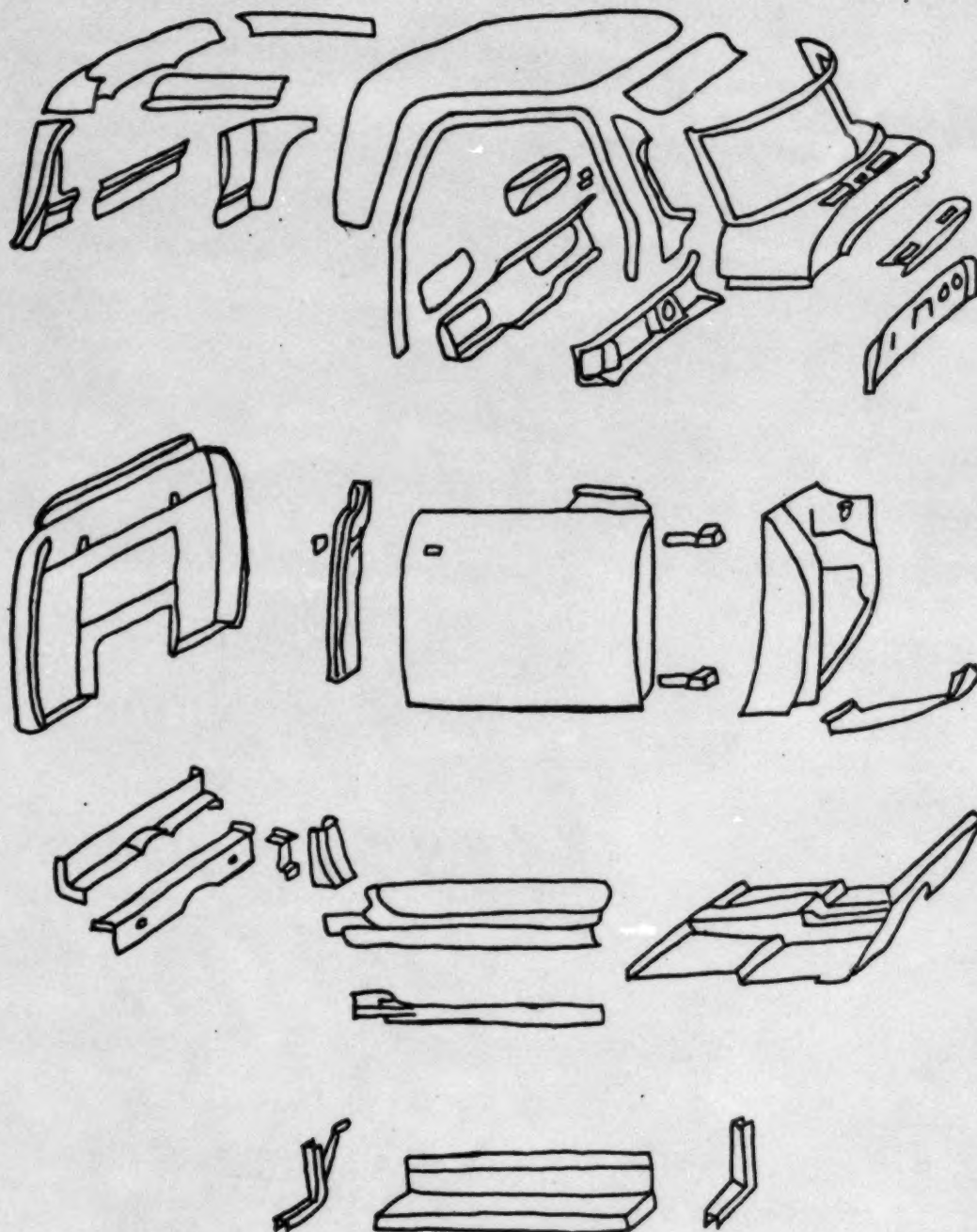
1. Panel del Piso - no se parece al convencional. Se compone de metal de forma I, de U, de caja y también abrazaderas para darle más solidez.

2. La Parte de Arriba de la Carrocería - se parece a la construcción convencional. La única diferencia es donde se juntan el baúl y los guardafangos delanteros.

3. Variaciones de carrocería que se unen al armazón y forman una sola unidad depende en los diferentes modelos de vehículos. En algunos casos todo el área del anterior se puede separar donde se junta con la pared contrafuegos.

8. Un técnico en carrocería debe de estudiar y de aprender todo tipo de construcción que corresponde a un automóvil si quiere éxito. Aplica toda su experiencia práctica y así sabe como va a reparar los daños. Esto le permitirá hacer un trabajo de calidad en menos tiempo.

8. The successful auto body technician is one who studies and learns all aspects of an automobile. He uses all his knowledge to formulate the course he will pursue in repairing the damage. This will enable him to do quality work in a minimum amount of time.



Individual Panels for Truck Cab

Fill in the blanks

1. The passenger compartment of a vehicle is called a _____
_____ or a _____.
2. All body constructions have an _____ and _____
construction.
3. Some body experts refer to the outer surface as the _____.
4. Braces, brackets and panels make up the _____ construction.
5. There are _____ types of body construction.
6. The difference between a four-door sedan and a four-door hardtop
is the _____ construction.
7. The _____, between the front and rear doors,
is the center pillar.
8. The cowl and dash assembly is sometimes called the _____.
9. The _____ is one of the largest panels.
10. Floor pan is another name for _____.
11. The _____ body strengthens and adds rigidity without
unnecessary _____.
12. The rear fenders and trunk are parts of the _____
panel.
13. The _____ body construction does not employ a conventional
frame.

True or False

- _____ 1. A vehicle's passenger compartment is the body proper or cab.
- _____ 2. The unitized body employs a conventional frame.
- _____ 3. Four door sedans have a center pillar that is as high as the lower door panel.
- _____ 4. The three types of body constructions are ; body and frame, unitized body and frame and unitized body.
- _____ 5. The most popular cars are four door sedans and four door fast backs.
- _____ 6. The body sides are greatly strengthened by the center pillar.
- _____ 7. The center body pillar also serves as a lock and hinge support.
- _____ 8. The success of an auto body technician depends on his knowledge of all aspects of auto body construction.
- _____ 9. Firewall is another name for the cowl.
- _____ 10. The unitized underbody can be removed from the frame.

Describe the following:

1. Cowl and dash assembly -

2. Roof assembly -

3. Underbody -

4. Rear quarter panel -

5. Center body pillars -

2. Describe in detail the unitized body construction.

Instructions:

The following reading contains information on types and uses of hardware and trim. Questions are included at the end of the section. Read all the information carefully then answer all the questions.

Instrucciones:

La siguiente lectura contiene información tocante a los tipos y usos de adornos y quincalla. Hay preguntas al término de la lectura. Léase toda la información cuidadosamente y luego conteste todas las preguntas.

Vocabulary

hardware
trim
decorative
handle
lock
bumper
grille
molding
upholstery

Vocabulario

quincalla
adorno
decorativo
manija
cerradura
parachoques
coraza
moldura
tapicería

Remember the following questions as you read the information.
Recuerde las siguientes preguntas al leer la información.

1. What purposes do hardware and trim serve?
¿Cuáles son los propósitos de adornos y quincalla?
2. What are the most common examples of hardware and trim?
¿Cuáles son los ejemplos más comunes de quincalla y adornos?

Hardware and Trim

1. After repairing damages on a vehicle, auto body technicians complete the job by adding the finishing touches. Hardware and trim are terms which refer to finishing touches of an automobile. These parts contribute to the comfort and convenience of the passenger, some have both a functional and decorative purpose.
2. Door and window handles, latches, locks, etc. are considered hardware parts. Trim parts include bumpers, grille, exterior and interior molding, also soft interior trim.
3. Hardware and trim are used on various sections of the body, usage is determined by the intended purpose. The following are the most common examples of finishing touches.

Grille - largest single unit of exterior trim, serves as protection for radiator.

Molding - is used both in the interior and exterior of the vehicle. Its primary function is decorative. Chrome used to cover windshield weather stripping is a good example of molding.

Bumpers - their primary function is to protect the vehicle from damage due to minor collision, also have decorative purpose.

Handles - used in interior and exterior of doors which lead to passenger compartment.

Door Trim Pads - cover lower section of inside door panels. Their primary function is decorative.

Upholstery and Seats - these have a functional and decorative purpose. Fabrics and other materials are used on upholstery.

1. Después de haber compuesto los daños en un vehículo, el técnico en carrocería monta los adornos para terminar su tarea. Estas partes sirven de convencia para el pasajero. Algunas sirven para adornar y otras tienen función más práctica.
2. Las manijas de las ventanas y las puertas, las cerraduras, etc. todas se consideran quincalla. Partes que adornan son los parachoques, el calado de adorno y la moldura del interior y el exterior.
3. Se usan según el propósito los adornos y la quincalla en diferentes secciones de la carrocería. Los siguientes son muestras más comunes de adornos y quincalla.

Calado de Adorno - la unidad exterior de adorno más grande y sirve para proteger el radiador.

Moldura - se usa en el interior y el exterior del vehículo. Primeramente sirve para adornar. El cromo que se usa para tapar el burlete (weather strip) del parabrisa es ejemplo de moldura.

Parachoques - primeramente protegen el vehículo de choques menores pero también decoran el vehículo.

Manijas - se usan en el interior y en el exterior de las puertas del coche.

Adornos Interiores de la Puertas - cubren la parte de abajo del interior de las puertas sirven solo para adornar.

Tapicería y Asientos - además de adornar, tienen también función práctica. Se usan diferentes materiales en su construcción.

4. Para montar y asegurar adornos y quincalla se usan tornillos, tuercas y ganchos. Estos ganchos se usan más extensivamente porque

4. Screws, bolts, nuts and fasteners are used for mounting hardware and trim. Fasteners are widely used because they make removal of hardware and trim much easier. There are many types of fasteners although their usage depends largely on the purpose of the hardware and trim. The diagram on page 38 illustrates the most commonly used fasteners. The auto body technician must learn the types of fasteners used on all sections of the body. This enables him to remove hardware and trim with a minimum amount of time and effort.

es más fácil quitar los adornos y la quincalla. Hay muchos tipos de ganchos, pero su uso depende en el propósito que tengan los adornos y la quincalla. El diagrama en la página 38 da un ejemplo de tornillos, tuercas y ganchos que se usan más. El técnico en carrocería debe de aprender y saber cuales tornillos, tuercas o ganchos se usan en las diferentes partes del coche. Esto le ayuda poder quitar los adornos y la quincalla en menos tiempo.



TRIM AND HARDWARE FASTENERS

Match the following: Fasteners Grille Handles Door trim pads Molding Upholstery Bumpers

A. Protects vehicle from damage due to minor collision.

B. Chrome that covers windshield weather-stripping.

C. Largest single unit of exterior trim.

D. Used for mounting hardware and trim.

E. Open doors and windows.

F. Cover rough door panels.

G. Fabrics and other materials.

True or False 1. Automobile bodies need hardware and trim to cover up the rough edges. 2. Door trim pads cover up the smooth edges of the upper door panels. 3. Finishing touches contribute to the comfort and convenience of the passenger. 4. An example of molding is the grille. 5. Nuts and bolts are used to mount hardware and trim; they make removal easier. 6. Fasteners are widely used throughout the vehicle's body. 7. Finishing touches is another name for hardware and trim. 8. Handles are used for opening and closing doors and windows. 9. There are many types of fasteners. 10. The same type of fastener is used throughout the auto body.

Answer the following:

1.5

1. What is the purpose of hardware and/or trim?

2. Name and describe six examples of hardware and trim.

1.

2.

3.

4.

5.

6.

3. Where are fasteners used and why?

POST TEST

Matching

Technicians

- | | |
|-----------------------------------|---|
| ___ Apprentice | A. knowledgeable regarding proper painting equipment. |
| ___ Journeyman | B. must be knowledgeable of auto body construction. |
| ___ Power Equipment Operator | C. technician who learns the trade by means of On the Job Training (OJT). |
| ___ Steering Alignment Specialist | D. should be able to estimate cost of repairs as accurately as possible. |
| ___ Auto Body Painter | E. highest paying position in the business, recommends to insurance companies expenditures for repairs. |
| ___ Insurance Adjuster | F. replaces and aligns steering mechanisms. |
| ___ Parts Manager | G. vocational program graduate eligible for this position. |
| ___ Estimator | H. person responsible for keeping reasonable inventory of collision parts. |

Metal Strengthening

- | | |
|---------------------|---|
| ___ Curved Surfaces | A. are commonly known as crowns. |
| ___ Low Crown | B. a flat piece of metal in which the two edges have been turned at right angles in the same direction. |
| ___ High Crown | C. a surface that has a small undersized curvature. |
| ___ U-Channels | D. after many years of research factories introduced this type of metal. |
| ___ Flanges | E. method of metal strengthening which employs 2 U-Channels welded together for more strength. |
| ___ Box Section | F. metal strengthening method most commonly used to stiffen any unsupported edges. |
| ___ Light Gauge | G. a surface which has an extreme rounded surface. |

Frames

- ___ Drop Center A. creates a lower center of gravity for added safety.
- ___ Large truck and bus frames B. a type of frame which is shaped as the letter X for added strength.
- ___ Unitized body construction C. such frames exclude the drop center and are usually built flat for cargo or passenger carrying space.
- ___ U-Channels - I-Beams box sections D. allows more room for the front wheels, hence a shorter turning radius.
- ___ X shaped frame E. steel rails used to construct vehicle frames.
- ___ Wide rear frame construction F. the underbody and the frame form one single unit.

Body Construction

- ___ Cab or body proper A. outer surfaces of an automobile.
- ___ "Skin" B. a term used in reference to a vehicles passenger compartment.
- ___ Inner construction C. composed of braces, brackets and panels which are used to strengthen the car.
- ___ Conventional body construction D. body and frame form separate units.

Panels

- ___ Cowl- Dash assembly A. largest panel.
- ___ Roof panel B. section that contains rear fenders and trunk.
- ___ Center body pillar C. also called "firewall".
- ___ Rear quarter D. strengthens the sides of the body and serves as door lock and hinge support.

Hardware and Trim

- | | |
|-----------------------|---|
| <u>Fasteners</u> | A. protects vehicle from damage due to minor collision. |
| <u>Grille</u> | B. chrome that covers windshield weatherstripping. |
| <u>Handles</u> | C. largest single unit of exterior trim. |
| <u>Door trim pads</u> | D. used for mounting hardware and trim. |
| <u>Molding</u> | E. open doors and windows. |
| <u>Upholstery</u> | F. cover rough door panels. |
| <u>Bumpers</u> | G. fabrics and other materials. |

AUTO BODY REPAIR
MODULE 1.0

BEGINNING AUTO BODY

SUPPLEMENTARY MATERIALS

MATHEMATICS, PUNCTUATION &
CAPITALIZATION, VOCABULARY
SPELLING & EXPRESSION

Auto Body Repair

VOCABULARY

Circle the word which is similar in meaning as the underlined word. (synonyms)

1. skilled technician

proper
expert
wrong

9. metal is formed

shaped
marked
warped

2. must be capable

able
complete
shrewd

10. metal is utilized

developed
used
needed

3. acquires knowledge

gains
require
evaluate

11. is currently being

conveniently
eventually
presently

4. proper use of

correct
original
minimal

12. usually

approximately
normally
wonderfully

5. is primarily found

evidently
totally
mainly

13. type of surface

view
kind
form

6. to estimate cost

appraise
sustain
imagine

14. shorter turning radius

distance
scope
circle

7. as accurately as possible

precisely
cleverly
frequently

15. front section

portion
arrangement
method

8. establishes pay scales

sustains
changes
sets up

16. frames are built

finished
manufactured
placed

17. stronger frames

sturdier
familiar
essential

18. are demonstrated

exhibited
recommended
strengthened

19. attached to the frame

fastened
impacted
belongs

20. outer surface

fancy
exterior
elaborate

21. vertical member

straight-up
definite
slanted

22. inner body

interior
central
concealed

23. important function

requirement
role
desire

24. resembles a U

looks like
imparts
projects

25. various types

efficient
diverse
practical

26. hire repairmen

adapt
understand
employ

27. mix paint thoroughly

exceptionally
considerably
completely

28. type of surface

kind
object
model

Auto Body Repair

SPELLING

- | | | |
|---|--|---|
| 1. A. technician
B. skiled
C. craftsman
D. none of these | 9. A. methods
B. formation
C. involved
D. none of these | 17. A. difference
B. arrangment
C. radius
D. none of these |
| 2. A. refered
B. apprentice
C. position
D. none of these | 10. A. characteristics
B. ilustration
C. encountered
D. none of these | 18. A. assembls
B. employ
C. exclude
D. none of these |
| 3. A. various
B. operate
C. equipment
D. none of these | 11. A. tendency
B. industry
C. original
D. none of these | 19. A. colision
B. attempt
C. advisable
D. none of these |
| 4. A. developes
B. damaged
C. panels
D. none of these | 12. A. extreme
B. portion
C. comonly
D. none of these | 20. A. create
B. structure
C. slightly
D. none of these |
| 5. A. prefer
B. capable
C. pading
D. none of these | 13. A. directions
B. engineers
C. combenation
D. none of these | 21. A. occured
B. compartment
C. brackets
D. none of these |
| 6. A. surface
B. throughly
C. model
D. none of these | 14. A. unitized
B. construction
C. durable
D. none of these | 22. A. nucleus
B. facter
C. popular
D. none of these |
| 7. A. strengthened
B. thickness
C. gage
D. none of these | 15. A. vehicle
B. gravity
C. demonstration
D. none of these | 23. A. vertical
B. quarter
C. suspention
D. none of these |
| 8. A. shapeing
B. curved
C. result
D. none of these | 16. A. inner
B. variations
C. pillar
D. none of these | 24. A. reinforcement
B. component
C. refinish
D. none of these |

Auto Body Repair
PUNCTUATION & CAPITALIZATION

Punctuate and capitalize the following sentences.

1. a power equipment operator must be knowledgeable in the use of power tools
2. what is meant by drop center
3. u-channels I-beams box sections etc are usually used in the construction of frames
4. make certain the heaviest crosspiece is placed at the front section of the engine said the shop foreman
5. the cars left side was completely demolished
6. the auto body repair shop will be closed on memorial day during the month of may
7. automotive collision work by edward d spicer is the textbook we are currently using
8. mr maestras is the auto body repair instructor at nnmcc
9. i first enrolled at nnmcc on jan 15 1978 said the auto body technician
10. on mondays tuesdays and wednesdays students work with power tools on thursdays and fridays they paint
11. a crowns surface has more of a tendency to return to its original form
12. what are the two types of body construction
13. members of vica will attend a conference in phoenix arizona
14. an alignment specialists job is replacing and aligning steering mechanisms
15. most employers prefer to hire vocational school graduates

Auto Body Repair
EXPRESSION

Rewrite any of the following phrases not written in standard English.

1. The glass installer don't got his tools today.
2. The auto body technician he must know how metal is formed.
3. Him and I, we are auto body repairmen.
4. With a cutting torch, the panel must be removed.
5. A cord on a power tool who is defective must be replaced.
6. No repairman must never paint over oily surfaces.
7. The drop center it create a low center of gravity.
8. The old paint of a frame must be removed before repainting.
9. The both fenders were damaged on the collision.
10. You had ought to refinish that fender.
11. "I must fix me that car fender by tomorrow," said the repairman.
12. The job should of been finish by 10:00 A.M.

Auto Body Repair Math Unit 1 - Addition and Subtraction of Whole Numbers.

Read the problems carefully and then complete the operation (s) necessary to find the answer.

1. The payroll in a body shop was: Salazar, \$185.00; Lujan, \$105.00; Sanchez, \$138.00; Romero, \$141.00. What is the total payroll?

Ans. _____

2. A repair shop used 611 pounds of solder in one (1) week, if they had 1200 pounds at the beginning of the week how much do they have at the end?

Ans. _____

3. A station wagon weighs 4850 pounds. The body weighs 2016 pounds, how much does the chassis weigh?

Ans. _____

4. An auto body repair shop earned the following amounts during a three year period: 1974, \$96,608; 1975, \$125,000 and 1976, \$133,467. How much did the shop earn during the three year period?

Ans. _____

5. Which number is larger 999,999 or 1,010,101? By how much?

Ans. _____

6. A paint shop used the following amounts of paint and thinner during 6 months of work: Jan. 150 gallons, Feb. 181 gallons, March 139 gallons, April 163 gallons, May 191 gallons and June 178 gallons. What was the total amount of paint and thinner used?

Ans. _____

7. A body man did the following repair jobs: straightened one fender \$100.00; replaced 2 grilles \$30.00; fixed a quarter panel \$75.00. What were his earnings?

Ans. _____

8. A car is 19 feet long, the garage is 28 feet long; the car is 6 feet wide, the garage is 15 feet wide. How much longer is the garage than the car? How much wider is the garage than the car?

Ans. _____

9. An insurance estimator did the following estimates for repair jobs during one week: Mon. \$200.00; Tue. \$1560.00; Wed. \$975.00; Thurs. \$480.00 and Fri. \$675.00. What were the total estimates for that week?

Ans. _____

10. An auto repair shop has 350 pounds of solder, if the following amounts, 26 pounds, 34 pounds and 96 pounds are used how much is left?

Ans. _____

Auto Body Repair Math Unit 2 - Multiplication & Division of Whole Numbers.

Read the problems carefully and then complete the operation(s) necessary to find the answer.

1. An auto body painter earned \$229.00 a week for 18 weeks. What were his total wages for those weeks?

Ans. _____

2. The total cost to repair a damaged vehicle was \$814.10. If the owner of the vehicle was allowed to pay that amount in seven (7) monthly payments, how much does he pay per month?

Ans. _____

3. If a bale of cleaning rags weighs 118 pounds. What would 9 bales weigh?

Ans. _____

4. An auto body shop payroll was \$3,696.00 for one week. If they paid 12 men, what was each man's salary?

Ans. _____

5. If a body man earns \$8.00 an hour and works 40 hours a week, what are his weekly earnings? What are his annual earnings?

Ans. _____

Ans. _____

6. An auto body shop owner earned \$32,640 in 24 months, how much did he average per month?

Ans. _____

7. If a body shop buys thinner at \$4.00 a gallon and it orders 112 gallons, how much does the shop have to pay for the order?

Ans. _____

8. A shop uses 2520 kilowatt hours of electricity in 210 days, how many kilowatt hours do they use per day?

Ans. _____

9. A body shop uses 56 pounds of solder per day, how much will they use in 5 days? It also uses 60 gallons of paint per day. How many gallons will they use in 30 days?

Ans. _____

Ans. _____

10. If a shop spends 4832 hours on paint jobs and there are 16 painters, how much time did each painter average?

Ans. _____

Auto Body Repair Math Unit 3 - Addition & Subtraction of Fractions

Read the problems carefully and then complete the operation(s) necessary to find the answer.

1. An auto body painter worked the following: Mon. $5 \frac{1}{2}$ hrs, Tues. $8 \frac{1}{4}$ hrs, Wed. $6 \frac{3}{4}$ hrs, Thurs. $4 \frac{1}{4}$ hrs, and Fri. 8 hrs. What were his total hours for the week?
Ans. _____
2. A body man used $\frac{4}{5}$ of a gallon of primer on one job and $\frac{2}{3}$ gallon on another job. What is the difference in the amounts used?
Ans. _____
3. Five (5) auto body repair specialists contributed the following amounts of time in completing a specific job: $1 \frac{3}{4}$ hrs, $4 \frac{1}{2}$ hrs, $3 \frac{1}{4}$ hrs, $2 \frac{1}{2}$ hrs and $1 \frac{1}{2}$ hrs. How much time did they spend on that specific job?
Ans. _____
4. A repair man needs a bolt $\frac{3}{8}$ inch long and $\frac{1}{2}$ inch in diameter. All he found was a bolt $\frac{1}{2}$ inch in diameter and $1 \frac{3}{4}$ of an inch long. How much should he cut?
Ans. _____
5. The following is the amount of time needed to complete a job: body work, $30 \frac{1}{2}$ hrs; painting, $2 \frac{2}{5}$ hrs; polishing, $1 \frac{1}{3}$ hrs. What is the total amount of time spent on the job?
Ans. _____
6. If a roll of masking tape has 25 yards and a painter cuts these pieces $11 \frac{1}{2}$ yds. $5 \frac{3}{4}$ yds, how much is left from the 25 yards?
Ans. _____
7. A body man took $12 \frac{1}{4}$ hours on body work; $4 \frac{2}{3}$ hrs. on painting, and $1 \frac{5}{8}$ hrs on polishing. What was the total time worked?
Ans. _____
8. A barrel of primer weighs $155 \frac{1}{2}$ pounds. If the barrel weighs $19 \frac{3}{4}$ pounds, what does the primer weigh?
Ans. _____
9. If a minor repair job requires the following amounts of time: $\frac{1}{2}$ hr. $\frac{5}{6}$ hr. and $\frac{3}{4}$ hr., what is the total time needed to complete the job?
Ans. _____
10. A paint drum holds 55 gallons. If the following amounts are used: $10 \frac{1}{2}$ gals., $6 \frac{3}{4}$ gals., and $4 \frac{3}{8}$ gals., how much is left in the drum?
Ans. _____

Vocabulary

accurate
acquire
adjuster
alignment
angle
apprentice
aspect
assemble
auto body
automobile
basic
bent
body
bolt
box
brace
bracket
bumper
business
cargo
chassis
compartment
component
construction
conventional
convertible
cowl

Vocabulario

exacto
adquirir
mediador
alineamiento
ángulo
aprendiz
aspecto
unir, juntar
carrocería
automóvil
básico
encorvadura
carrocería
tornillo
caja
abrazadera
abrazadera
parachoques
negocio
carga
chasis
compartimiento
parte
construcción
ordinario
convertible
pared contra fuegos

Vocabulary

craftsman
create
crosspiece
crown
curved
damage
dash
decorative
demonstrate
dent
develop
drop center
durable
edge
eligible
employ
encounter
estimator
extreme
factor
fasteners
fender
filler
firewall
flange
flat

Vocabulario

artesano
crear
parte transversal
corona
encorvado
daño
tablero de instrumentos
decorativo
demonstrar
abolladura
desarrollar
centro sumido
durable
orilla
elegible
emplear
encontrar
estimador
extremo
factor
ganchos
guardafango
masilla
pared contrafuegos
reborde
plano

Vocabulary

foot
form
formulate
frame
gauge
graduate
gravity
grille
handle
hard top
hardware
hinge
hood
illustration
industry
inner
inspect
install
journeyman
knowledge
latch
load
lock
mask
match
member
metal

Vocabulario

pie
forma
formular
armazón
gruesor
graduante
gravedad
coraza
manija
capota dura
quincalla
bisagra
capó
ilustración
industria
interior
inspektar
instalar
jornalero
conocimiento
aldaba
carga
cerradura
máscara
igualar
miembro
metal

Vocabulary

method
mix
model
molding
nucleus
operator
outer
painter
panel
passenger
pillar
power equipment
produce
radius
rail
repair
replace
rigid
safety
sanding
screw
seat
seat cover
sedan
sheet metal
skill
spring
steel

Vocabulario

método
mezclar
modelo
moldura
núcleo
operario
exterior
pintor
hoja
pasajero
pilar
equipo motriz
producir
radio
riel
reparo
reponer
rígido
seguridad
lijar
tornillo
asiento
torros de asientos
sedán
hoja metálica
abilidad
resorte, sopanda
acero

Vocabulary

steering mechanism

stiffen

strain

strength

style

surface

suspension

task

technician

tendency

thick

trade

training

trim

trunk

u-channel

underbody

unit

unitize

upholsterer

various

vehicle

vertical

vinyl

vocational

weld

windshield

steel

Vocabulario

mecanismo de dirección

atiesar

extender

solidez

estilo

superficie

suspensión

tarea

técnico

tendencia

grueso

comercio

enseñansa

adorno

compartimiento de portaequipajes,
baul

canal-u

panel del piso

unidad

unificar

tapicero

varios

vehículo

vertical

vinilo

vocacional

soldar

parabrisas

acero